CLAIMS:

1. A method of compositing a plurality of graphics images and video comprising:

blending said graphics images into a blended graphics image using a plurality of alpha values, each graphics image comprising a plurality of pixels, and each pixel being associated with one of said alpha values, the graphics images being organized into layers, each graphics image being on and associated with a layer;

combining said alpha values into a plurality of composite alpha values by combining each alpha value of the graphics image on one layer with a corresponding alpha value of the graphics image on another layer; and

blending the blended graphics image and the video using the composite alpha values.

2. The method according to claim 1, wherein blending said graphics images comprises blending the graphics image on a second layer on top of the graphics image on a first layer to generate an intermediate image.

3. The method according to claim 2, wherein blending the graphics image on the second layer on top of the graphics image on the first layer comprises blending each pixel of the graphics image on the first layer with a corresponding pixel of the graphics image on the second layer, using the alpha values associated with the pixels of the graphics image on the second layer.

4. The method according to claim 3, wherein blending each pixel of the graphics image on the first layer with the corresponding pixel of the graphics image on the second layer comprises: multiplying each pixel of the graphics image on the first layer by (1-alpha value) of the alpha value associated with the corresponding pixel of the graphics image on the second layer; multiplying each pixel of the graphics image on the second layer by the associated alpha value; and adding products of the two multiplications.

5. A method of compositing a plurality of graphics images and video comprising:

blending the plurality of graphics images into a blended graphics image using a plurality of alpha values, each graphics image comprising a plurality of pixels, and each pixel being associated with one of said alpha values, the graphics images being organized into layers, each graphics image being on and associated with a layer;

combining said alpha values into a plurality of composite alpha values by combining each alpha value of the graphics image on one layer with a corresponding alpha value of the graphics image on another layer; and

blending the blended graphics image and the video using the composite alpha values,

wherein blending said graphics images into the blended graphics image comprises blending the graphics image on a second layer on top of the graphics image on a first layer to generate an intermediate image, and

blending a graphics image that has not been blended yet, on top of the intermediate image to generate a new intermediate image.

6. The method according to claim 5, wherein blending the graphics image that has not been blended yet comprises blending each pixel of the intermediate image with a corresponding pixel of the graphics image that has not been blended yet, using the alpha values associated with the pixels of the graphics image that has not been blended yet.

7. The method according to claim 6, wherein blending each pixel of the intermediate image with the corresponding pixel of the graphics image that has not been blended yet comprises: multiplying each pixel of the intermediate image by (1-alpha value) of the alpha value associated with the corresponding pixel of the graphics image that has not been blended yet; multiplying each pixel of the graphics image that has not been blended yet by the associated alpha value; and adding products of the two multiplications.

8. A method of compositing a plurality of graphics images and video comprising the steps of:

blending the plurality of graphics images into a blended graphics image;

combining a plurality of alpha values into a plurality of composite alpha values; and

blending the blended graphics image and the video using the plurality of composite alpha values,

wherein the plurality of graphics images are blended together using the plurality of alpha values,

wherein each of the plurality of graphics images includes a plurality of pixels, and each of the plurality of pixels is associated with one of the plurality of alpha values, and

wherein the step of combining a plurality of alpha values into a plurality of composite alpha values comprises the step of multiplying (1-alpha value) associated with each of the plurality of pixels of a graphics image with (1-alpha value) associated with a corresponding pixel of each of all other graphics images to generate each of the plurality of composite alpha values.

9. A method of compositing a plurality of graphics images and video comprising the steps of:

blending the plurality of graphics images into a blended graphics image;

combining a plurality of alpha values into a plurality of composite alpha values; and

blending the blended graphics image and the video using the plurality of composite alpha values,

wherein the plurality of graphics images are blended together using the plurality of alpha values,

wherein each of the plurality of graphics images includes a plurality of pixels, and each of the plurality of pixels is associated with one of the plurality of alpha values,

wherein the plurality of graphics images are organized into layers, each of the plurality of graphics images being

associated a layer, from the back most layer to the front most layer, and

wherein the step of combining a plurality of alpha values into a plurality of composite alpha values comprises the step of multiplying (1-alpha value) associated with each of the plurality of pixels of the graphics image on a first layer by (1-alpha value) associated with a corresponding one of the plurality of pixels of the graphics image on a second layer to generate a plurality of intermediate alpha values.

10. The method of compositing a plurality of graphics images and video of claim 9 wherein the step of combining a plurality of alpha values into a plurality of composite alpha values further comprises the step of multiplying each of the plurality of intermediate alpha values with (1-alpha value) associated with a corresponding one of the plurality of pixels of the graphics image whose alpha values previously have not been multiplied into the plurality of intermediate alpha values, to newly generate a plurality of intermediate alpha values.

11. The method of compositing a plurality of graphics images and video of claim 10 wherein the step of combining a plurality of alpha values into a plurality of composite alpha values further comprises the step of repeating the step of multiplying each of the plurality of intermediate alpha values with (1-alpha value) associated with a corresponding one of the plurality of pixels of the graphics image whose alpha values previously have not been multiplied into the plurality of intermediate alpha values, to newly generate a plurality of

intermediate alpha values, until alpha values of all graphics images have been multiplied, and

wherein the newly generated plurality of intermediate alpha values, after the alpha values of all graphics images have been multiplied, are the plurality of composite alpha values.

12. A method of compositing a plurality of graphics images and video comprising:

blending the plurality of graphics images into a blended graphics image using a plurality of alpha values, each graphics image comprising a plurality of pixels, and each pixel being associated with one of said alpha values, the graphics images being organized into layers, each graphics image being on and associated with a layer;

combining said alpha values into a plurality of composite alpha values by combining each alpha value of the graphics image on one layer with a corresponding alpha value of the graphics image on another layer;

blending the blended graphics image and the video using the composite alpha values; and

filtering the blended graphics image prior to blending the blended graphics image with the video,

wherein filtering comprises vertical scaling.

13. A method of compositing a plurality of graphics images and video comprising:

blending the plurality of graphics images into a blended graphics image using a plurality of alpha values, each graphics image comprising a plurality of pixels, and each pixel

being associated with one of said alpha values, the graphics images being organized into layers, each graphics image being on and associated with a layer;

combining said alpha values into a plurality of composite alpha values by combining each alpha value of the graphics image on one layer with a corresponding alpha value of the graphics image on another layer;

blending the blended graphics image and the video using the composite alpha values; and

filtering the blended graphics image prior to blending the blended graphics image with the video,

wherein filtering comprises horizontal scaling.

14. A method of compositing a plurality of graphics images and video comprising:

blending the plurality of graphics images into a blended graphics image using a plurality of alpha values, each graphics image comprising a plurality of pixels, and each pixel being associated with one of said alpha values, the graphics images being organized into layers, each graphics image being on and associated with a layer;

combining said alpha values into a plurality of composite alpha values by combining each alpha value of the graphics image on one layer with a corresponding alpha value of the graphics image on another layer;

blending the blended graphics image and the video using the composite alpha values; and

filtering the blended graphics image prior to blending the blended graphics image with the video,

wherein filtering comprises anti-flutter filtering.

15. A method of compositing a plurality of graphics images and video comprising:

blending the plurality of graphics images into a blended graphics image using a plurality of alpha values, each graphics image comprising a plurality of pixels, and each pixel being associated with one of said alpha values, the graphics images being organized into layers, each graphics image being on and associated with a layer;

combining said alpha values into a plurality of composite alpha values by combining each alpha value of the graphics image on one layer with a corresponding alpha value of the graphics image on another layer; and

blending the blended graphics image and the video using the composite alpha values,

wherein the video comprises a passthrough video and a video window.

16. The method according to claim 15 further comprising blending background color with the video.

17. The method according to claim 16 wherein the passthrough video is blended with the background color using alpha values to generate an intermediate video image.

18. The method according to claim 17 wherein the video window is blended with the intermediate video image using alpha values to generate a blended video image.

19. The method according to claim 18 wherein the blended video image is blended with the blended graphics image using the composite alpha values.

20. The method according to claim 19 wherein the blended video image comprises a plurality of video pixels and the blended graphics image comprises a plurality of graphics pixels, and each of the plurality of composite alpha values is associated with one of the video pixels and one of the graphics pixels.

21. The method according to claim 20 wherein blending the blended graphics image and the video comprises multiplying each video pixel by the associated composite alpha value; and adding each graphics pixel to the product of the associated video pixel and the associated composite alpha value.

22. A graphics display system comprising:

a display engine for blending a plurality of graphics images, each graphics image being on one of a plurality of layers, into a blended graphics image using a plurality of alpha values, and combining said alpha values into a plurality of composite alpha values by combining each alpha value of one graphics image with a corresponding alpha value of another graphics image; and

a video compositor for blending the blended graphics image with video using the composite alpha values.

23. The display system according to claim 22, wherein the video compositor also blends a background color with the blended graphics image and the video.

24. The display system according to claim 23, wherein the video comprises a passthrough video and a video window.

25. The graphics display system of claim 24 wherein the video compositor blends the passthrough video with the background color to generate an intermediate video image.

26. The graphics display system of claim 25 wherein the video compositor blends the intermediate video image with the video window to generate a blended video image having a plurality of video pixels.

27. The graphics display system of claim 26 wherein the blended graphics image includes a plurality of graphics pixels, each of the plurality of video pixels is associated with one of the plurality of composite alpha values and one of the plurality of graphics pixels, and video compositor blends the blended video image and the blended graphics by multiplying each of the plurality of video pixels by the associated one of the plurality of composite alpha values and adding the associated one of the plurality of graphics pixels.

28. A graphics display system comprising:

a display engine for blending a plurality of graphics images into a blended graphics image and combining a plurality

of alpha values into a plurality of composite alpha values; and a video compositor for blending the blended graphics image with video,

wherein each of the plurality of graphics images includes a plurality of graphics pixels, and each of the plurality of alpha values is associated with one of the plurality of graphics pixels,

wherein the plurality of graphics images are organized into layers, wherein each of the plurality of graphics images is on and associated with a layer that is different from each other and the layers are stacked from the back most layer to the front most layer, and

wherein each of the plurality of graphics pixels of the graphics image on the back most layer is multiplied by (1-alpha value) of the alpha value associated with a corresponding one of the plurality of graphics pixels of the graphics image on the layer immediately in front of the back most layer, each of the plurality of graphics pixels of the graphics image on the layer immediately in front of the back most layer is multiplied by the associated alpha value, and the products of two multiplications are added to generate each of the plurality of graphics pixels of an intermediate graphics image.

29. The graphics display system of claim 28 wherein each of the plurality of graphics pixels of the intermediate graphics image is multiplied by (1-alpha value) of the alpha value associated with a corresponding one of the plurality of graphics pixels of the graphics image on the layer immediately in front of all layers for which the associated graphics image has been

blended, each of the plurality of graphics pixels of the graphics image, on the layer immediately in front of all layers for which the associated graphics image has been blended, is multiplied by the associated alpha value, and the products of two multiplications are added to generate each of the plurality of graphics pixels of a new intermediate graphics image.

30. The graphics display system of claim 29 wherein the plurality of graphics pixels of a new intermediate graphics image are repeatedly generated until each of the plurality of graphics pixels of the intermediate graphics image is multiplied by (1-alpha value) of the alpha value associated with a corresponding one of the plurality of graphics pixels of the graphics image on the front most layer, each of the plurality of the graphics pixels of the graphics image on the front most layer has been multiplied with the associated alpha value, and the products of the two multiplications are added to generate each of the plurality of graphics pixels of the new intermediate graphics image,

and wherein the new intermediate graphics image is the blended graphics image after the graphics image on the front most layer has been blended.

31. A graphics display system comprising:

a display engine for blending a plurality of graphics images into a blended graphics image and combining a plurality of alpha values into a plurality of composite alpha values; and

a video compositor for blending the blended graphics image with video,

wherein each of the plurality of graphics images includes a plurality of graphics pixels, and each of the plurality of alpha values is associated with one of the plurality of graphics pixels,

wherein the plurality of graphics images is organized into layers, wherein each of the plurality of graphics images is on and associated with a layer that is different from each other and the layers are stacked from the back most layer to the front most layer,

wherein (1-alpha value) of the alpha value associated with each of the plurality of the pixels of the graphics image on the back most layer is multiplied by (1-alpha value) associated with a corresponding one of the plurality of the pixels of the graphics image on the layer immediately in front of the back most layer to generate each of the plurality of intermediate alpha values, and

wherein each of the plurality of intermediate alpha values is multiplied by (1-alpha) of the alpha value associated with each of the plurality of the pixels of the graphics image on the layer that is immediately in front of all layers for which associated plurality of alpha values have been multiplied into the plurality of intermediate alpha values, to newly generate the plurality of intermediate alpha values.

32. The graphics display system of claim 31 wherein the plurality of intermediate alpha values are newly generated repeatedly until the plurality of alpha values associated with the plurality of pixels of the graphics image on the front most layer have been multiplied into the plurality of intermediate

alpha values, and

wherein the plurality of intermediate alpha values after the plurality of alpha values associated with the plurality of pixels of the graphics image on the front most layer are the plurality of composite alpha values.

33. A method of compositing graphics images using alpha blend values comprising the steps of:

blending each line of a second graphics image on top of a corresponding line of a first graphics image using alpha values, if the line is neither a first line nor a last line of the second graphics image; and

blending the first line and the last line of the second graphics image on top of the corresponding lines of the first graphics image using about 0.5 * alpha blend values,

wherein the second graphics image includes a plurality of pixels, each pixel being associated with an alpha blend value, and the first graphics image includes a plurality of pixels,

wherein the step of blending each line of a second graphics image on top of a corresponding line of a first graphics image, if the line is neither a first line nor a last line of the second graphics image, comprises the steps of multiplying each of the plurality of pixels of the first graphics image by (1-alpha blend value) of the alpha blend value associated with a corresponding pixel of the second graphics image, multiplying the corresponding pixel of the second graphics image with the associated alpha blend value, and adding the products of the two multiplications.

34. A method of compositing graphics images using alpha blend values comprising the steps of:

blending each line of a second graphics image on top of a corresponding line of a first graphics image using alpha values, if the line is neither a first line nor a last line of the second graphics image; and

blending the first line and the last line of the second graphics image on top of the corresponding lines of the first graphics image using about 0.5 * alpha blend values,

wherein the second graphics image includes a plurality of pixels, each pixel being associated with an alpha blend value, and the first graphics image includes a plurality of pixels,

wherein the step of blending the first line and the last line of the second graphics image on top of the corresponding lines of the first graphics image using about 0.5 * alpha blend values comprises the steps of multiplying each of the plurality of pixels of the first graphics image by (1 B 0.5 * alpha blend value) of the alpha blend value associated with a corresponding pixel of the second graphics image, multiplying the corresponding pixel of the second graphics image with the associated alpha blend value * 0.5, and adding the products of the two multiplications.

35. A method of blending a plurality of image layers comprising:

organizing the plurality of image layers into upper image layers and at least one lower image layer;

blending the upper image layers into a blended upper image layer;

combining a plurality of alpha values associated with the upper image layers into a plurality of composite alpha values; and

compositing the blended upper image layer and the at least one lower image layer using the plurality of composite alpha values.

36. The method of claim 35, wherein the plurality of upper image layers are blended together using the plurality of alpha values.

37. The method of claim 36, wherein each of the plurality of upper image layers is associated with at least one of the plurality of alpha values.

38. The method of claim 37, wherein each of the plurality of upper image layers comprises a plurality of pixels that are associated with the at least one of the plurality of alpha values.

39. The method of claim 38, wherein blending the upper image layers comprises:

ordering the upper image layers from a back most upper image layer to a front most upper image layer; and

blending the ordered upper image layers in an order from the back most upper image layer to the front most upper image layer.

40. The method of claim 39, wherein blending the upper images layers further comprises:

multiplying each of the plurality of pixels of a second back most upper image layer by an associated one of the plurality of alpha values;

multiplying each of the plurality of pixels of the back most upper image layer by one minus the alpha value associated with a corresponding one of the plurality of pixels on the second back most upper image layer; and

adding the multiplied pixels of the back most upper image layer to the corresponding multiplied pixels of the second back most upper image layer.

41. The method of claim 35, further comprising spatially processing the blended upper image layer prior to compositing it with the at least one lower image layer.

42. The method of claim 41, wherein spatially processing comprises two-dimensional filtering.

43. The method of claim 35, wherein the at least one lower image layer comprises a plurality of lower image layers, the method further comprising blending the plurality of lower image layers together to generate a blended lower image layer prior to compositing it with the blended upper image layer.

44. A display system for compositing a plurality of image layers comprising upper image layers and at least one lower

image layer, comprising:

a display engine for blending the upper image layers into a blended upper image layer and for combining a plurality of alpha values associated with the upper image layers into a plurality of composite alpha values; and

a compositor for compositing the blended upper image layer and the at least one lower image layer using the plurality of composite alpha values.

45. The display system of claim 44, wherein the plurality of upper image layers are blended together using the plurality of alpha values.

46. The display system of claim 45, wherein each of the plurality of upper image layers is associated with at least one of the plurality of alpha values.

47. The display system of claim 46, wherein each of the plurality of upper image layers comprises a plurality of pixels that are associated with the at least one of the plurality of alpha values.

48. The display system of claim 47, wherein the upper image layers are ordered from a back most upper image layer to a front most upper image layer, and

wherein the display engine blends the ordered upper image layers in an order from the back most upper image layer to the front most upper image layer.

49. The display system of claim 48, wherein each of the plurality of pixels of a second back most upper image layer are multiplied by an associated one of the plurality of alpha values,

wherein each of the plurality of pixels of the back most upper image layer are multiplied by one minus the alpha value associated with a corresponding one of the plurality of pixels on the second back most upper image layer, and

wherein the multiplied pixels of the back most upper image layer are added to the corresponding multiplied pixels of the second back most upper image layer.

50. The display system of claim 44, wherein the blended upper image layer is spatially processed prior to compositing it with the at least one lower image layer.

51. The display system of claim 50, wherein the spatial processing comprises two-dimensional filtering.

52. The display system of claim 44, wherein the at least one lower image layer comprises a plurality of lower image layers, and

wherein the plurality of lower image layers are blended together to generate a blended lower image layer prior to compositing it with the blended upper image layer.